THE CLAIMS

What is claimed is:

1. A catalyst member comprising:

a carrier substrate having an anchor layer disposed thereon by electric arc spraying; and

catalytic material disposed on the carrier substrate.

2. The catalyst member of claim 1 wherein the anchor layer is deposited by electric arc spraying a metal feedstock selected from the group consisting of nickel, Ni/Al, Ni/Cr, Ni/Cr/Al/Y, Co/Cr, Co/Cr/Al/Y, Co/Ni/Cr/Al/Y, Fe/Al, Fe/Cr, Fe/Cr/Al, Fe/Cr/Al/Y, Fe/Ni/Al, Fe/Ni/Cr, 300 series stainless steels, 400 series stainless steels, and mixtures of two or more thereof.

3. The catalyst member of claim 2 wherein the anchor layer comprises nickel and aluminum.

4. The catalyst member of claim 3 wherein the aluminum comprises from about 3 to 10 percent of the combined weights of nickel and aluminum in the anchor layer.

5. The catalyst member of claim 3 wherein the aluminum comprises from about 4 to 6 percent aluminum of the combined weights of nickel and aluminum in the anchor layer.

6. The catalyst member of claim 1 wherein the catalytic material is deposited on the anchor layer and comprises a refractory metal oxide support on which one or more catalytic metal components are dispersed.

7. The catalyst member of claim 1 comprising a substrate selected from the group consisting of metal substrates and ceramic substrates.

8. An exhaust treatment apparatus comprising the catalyst member of claim 1, claim 3 or claim 4 connected in the exhaust flow path of an internal combustion engine.

9. The apparatus of claim 8 wherein the metal substrate comprises the interior surface of a conduit through which the exhaust of an internal combustion engine is flowed prior to discharge of the exhaust.

10. The apparatus of claim 8 wherein the carrier substrate comprises a metal substrate.

11. The apparatus of claim 8 wherein the carrier substrate comprises a ceramic substrate.

12. A catalyst member comprising:

a carrier comprising an open substrate and having an anchor layer disposed thereon by thermal spraying; and

catalytic material disposed on the carrier.

13. The catalyst member of claim 12 wherein the carrier comprises a substrate selected from the group consisting of foamed metal substrates and honeycomb monolith substrates.

14. The catalyst member of claim 13 wherein the substrate comprises a foamed metal substrate.

15. The catalyst member of claim 14 wherein the foamed metal substrate has from about 3 to 30 pores per lineal inch ("ppi").

16. The catalyst member of claim 14 wherein the foamed metal substrate has from about 3 to 10 ppi.

17. The catalyst member of claim 14 wherein the foamed metal substrate has from about 10 to 80 ppi.

18. The catalyst member of claim 14 wherein the foamed metal substrate has a density of about 6 percent of the density of the metal from which it was formed.

19. A catalyst member comprising:

a carrier substrate comprising at least two regions of different substrate densities disposed for fluid flow from one region to the other; and

a catalytic material deposited on the at least two substrate regions of different surface area densities.

20. The catalyst member of claim 19 wherein the at least two substrate regions of different substrate densities have thereon different effective loadings of the catalytic material.

21. The catalyst member of claim 19 or claim 20 wherein the at least two substrate regions comprise regions of substrates selected from the group consisting of foamed metal, wire mesh and corrugated foil honeycomb.

22. A method for manufacturing a catalyst member comprising:

depositing by electric arc spraying a metal feedstock onto a substrate to provide a metal anchor layer on the substrate, and

depositing a catalytic material onto the substrate.

23. The method of claim 22 comprising depositing the catalytic material by means other than electric arc spraying.

24. The method of claim 23 wherein depositing the catalytic material comprises coating the metal anchor layer with a catalytic material comprising a refractory metal oxide support on which one or more catalytic components are dispersed.

25. The method of claim 22 comprising electric arc spraying a molten metal feedstock at a temperature that permits the molten metal to freeze into an irregular surface configuration upon impinging on the substrate surface.

26. The method of claim 25 comprising spraying the molten metal with an arc temperature of not more than about 10,000°F.

27. A method for manufacturing a catalyst member comprising:

electric arc spraying a metal feedstock onto at least one substrate to provide at least one anchor layer-coated substrate;

depositing onto the at least one anchor layer-coated substrate a catalytic material comprised of a bulk refractory metal oxide having dispersed thereon one or more catalytically active components to provide at least one catalyzed substrate; and

incorporating the at least one catalyzed substrate into a body configured to define an inlet opening and an outlet opening and so configuring and disposing the at least one catalyzed substrate between the inlet and outlet openings to define a plurality of fluid flow paths therebetween.

28. The method of any one of claims 22-27 wherein the anchor layer is deposited by electric arc spraying a metal feedstock selected from the group consisting of nickel, Ni/Cr/Al/Y, Co/Cr/Al/Y, Fe/Cr/Al/Y, Co/Ni/Cr/Al/Y, Fe/Ni/Cr, Fe/Cr/Al, Ni/Cr, Ni/Al, 300 series stainless steels, 400 series stainless steels, Fe/Cr and Co/Cr, and mixtures of two or more thereof.

29. The method of claim 28 wherein the aluminum comprises from about 3 to 10 percent of the combined weights of nickel and aluminum in the anchor layer.

30. The method of claim 28 wherein the aluminum comprises from about 4 to 6 percent of the combined weights of nickel and aluminum in the anchor layer.

31. The method of any one of claims 22 through 27 wherein the substrate comprises a ferritic steel foam.

32. The method of claim 31 wherein the metal feedstock is selected from the group consisting of nickel, Ni/Cr/Al/Y, Co/Cr/Al/Y, Fe/Cr/Al/Y, Co/Ni/Cr/Al/Y, Fe/Ni/Cr, Fe/Cr/Al, Ni/Cr, Ni/Al, 300 series stainless steels, 400 series stainless steels, Fe/Cr and Co/Cr, and mixtures of two or more thereof.

33. The method of claim 32 wherein the aluminum comprises from about 3 to 10 percent of the combined weights of nickel and aluminum in the anchor layer.

34. An exhaust treatment apparatus comprising:

a catalyzed substrate comprising a metal substrate defining a plurality of fluid flow passages therethrough and having thereon an anchor layer electric arc sprayed thereon and a catalytic material disposed on the anchor layer, the catalytic material comprising a bulk refractory metal oxide having dispersed thereon one or more catalytically active metal components; and

a canister having an inlet opening and an outlet opening and within which the catalyzed metal substrate is enclosed, the catalyzed metal substrate being disposed between the inlet and outlet openings, whereby at least some of a fluid flowing through the canister between the inlet and outlet openings thereof is constrained to follow the fluid flow paths and thereby contact the catalyzed metal substrate.

35. The catalyst member of claim 34 wherein the catalyzed metal substrate is configured and positioned within the canister whereby substantially all of a fluid flowing through the canister between the inlet and outlet openings thereof is constrained to follow the fluid flow paths and thereby contact the catalyzed metal substrate.

36. A method for treating the exhaust stream from an engine, comprising flowing the exhaust stream into contact with the catalyst member of claim 1 or claim 19.

37. In a motorcycle comprising an engine and an exhaust treatment apparatus, the improvement comprising that the exhaust treatment apparatus comprises a catalyst member according to any one of claims 1-6, 19 or 20.

38. A utility engine comprising an exhaust apparatus comprising a catalyst member according to any one of claims 1-6, 18 or 19.

39. In a lawn mower comprising an engine and an exhaust treatment apparatus, the improvement comprising that the engine comprises the utility engine of claim 38.

40. A method for manufacturing a catalyst member to conform to a mounting container, comprising:

depositing an anchor layer onto a pliable substrate to provide an anchor layer coated substrate;

depositing a catalytic material onto the substrate; and

reshaping the substrate to conform to the container after depositing at least the anchor layer thereon.

41. The method of claim 40 wherein depositing the anchor layer comprises thermally spraying a metal feedstock onto the substrate.

42. The method of claim 40 wherein depositing the anchor layer comprises electric arc spraying a metal feedstock onto the substrate.

43. The method of claim 40, claim 41 or claim 42 comprising reshaping the substrate after depositing the catalytic material thereon.

44. The method of claim 40, claim 41 or claim 42 further comprising mounting the catalyst member in the container.

45. The method of claim 40 wherein depositing the anchor layer comprises plasma spraying a metal feedstock onto the substrate.